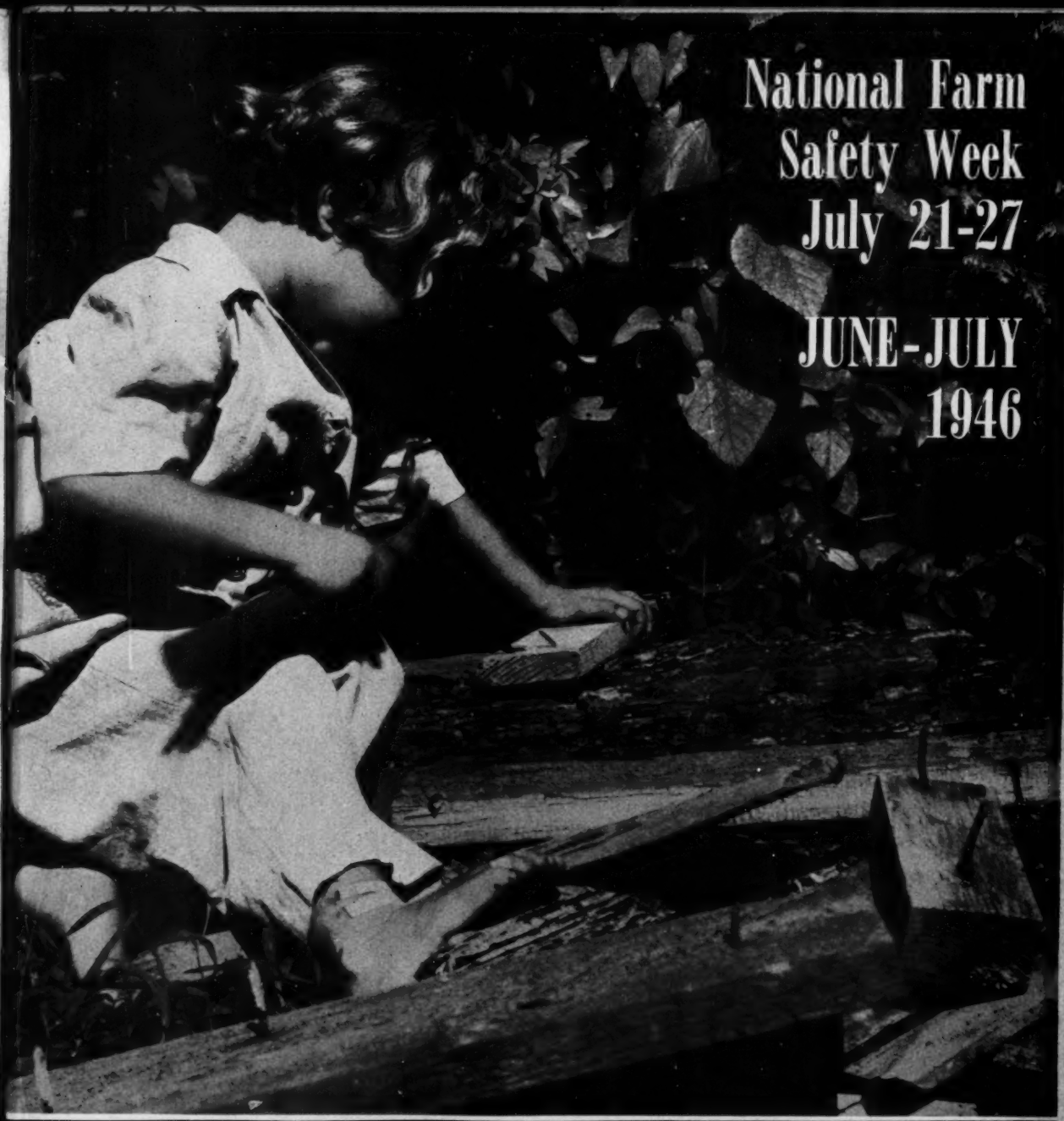

National Farm Safety Week July 21-27

JUNE-JULY 1946

SOIL CONSERVATION

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UNITED STATES DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

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WELLINGTON BRINK, EDITOR

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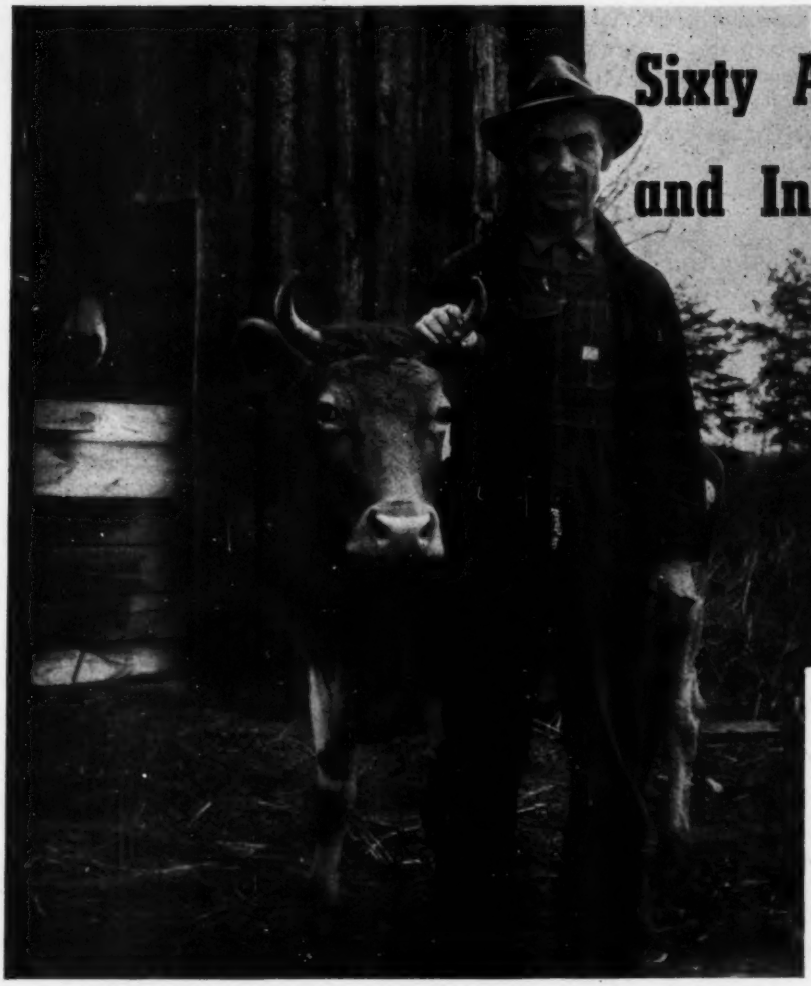
Sixty Acres and Independence

by

J. J. Ernestes



Mr. Flynn with one of the two registered Guernseys from which he is building a foundation herd of purebred dairy cattle.

L. C. FLYNN, a cooperator with the Tri-Creek Soil Conservation District in North Carolina, began and ended a war all by himself right out in the hills of Belews Creek, where he has been farming about 60 acres for the past 5 years.

The soil conservation plan which Flynn worked out for his farm in 1941, in cooperation with the Tri-Creek District, was his official "declaration of war" against soil erosion on his rolling-to-steeply-rolling and low-producing land.

Coincidentally, his plan was prepared during Pearl Harbor month, but his attack on erosion could not be classed as a sneak attack. On the contrary it was openly planned, and embodied every essential required to insure the accomplishment of three objectives: to control erosion, to make a decent living, and to pay off a 100 percent mortgage on the farm. In 1941 he owed $4,000 on the farm, the original cost of the 60 acres. His livestock and tools, worth about $400, were clear.

On fields selected as being satisfactory for continuous cultivation, the plan included terracing, contour strip-cropping, and the establishment of a soil-building rotation of crops. Permanent pastures were to be established. Planned woodland improvement was included, to provide the fuel needs of the farm and at the same time improve the growing conditions for future crop trees. Finally, the seeding of wildlife borders was undertaken to control erosion and to give food and shelter for wildlife.

NOTE.—The author is work unit conservationist of the Tri-Creek Soil Conservation District in North Carolina.

To complete the parallel between World War II and Flynn's war on soil erosion, the year 1945 marked the end of each. Flynn recently reported that his conservation plan has been carried out to the letter. He was telling us this while waving before our eyes what he called his "discharge paper," the deed to his farm—a deed 100 percent free of any sort of mortgage. During the 4 years of soil conservation farming he had paid back the $4,000 he owed, had increased the value of his livestock and equipment to approximately $1,000, and by the beginning of 1946 had accumulated $1,500 in cash.

If you, at age 56, had been a tenant farmer for 35 years, like Flynn, you could understand his new feeling of security.

Flynn is so completely sold on soil conservation farming that he now has designated himself as a "one-man army of occupation" to make certain that the soils on his farm will never again lose their productivity because of erosion. Those are soils which have bounced back to higher production, as reflected in corn yields which have increased from 15 to 70 bushels per acre.

Soil conservation paid off the $4,000 mortgage in four years, through increased production. No wonder Mr. and Mrs. Flynn smile happily as they look at the document in the living room of their home.

War Production And Soil Deterioration

NOTE.—This article is taken from the Annual Report of Mahaska County Soil Conservation District Commissioners, Oskaloosa, Iowa; John Eveland, chairman, Cecil Smith and Ike Herney, members.

THE FARMERS of Mahaska County sent their acres to war and too many of those acres are not going to come back. We of this county shall regret their loss. While this loss can never have the place in our memories comparable to those brave GI's who will never return, still the loss of so appreciable an amount of the material resources of this country is bound to be felt by those of this present generation and of generations to come.

The commissioners of the Mahaska County Soil Conservation District and those associated with us, have used our every effort and all the resources available to us to make damage done as small as possible. Our efforts were not enough. Though that which we have accomplished is important, we had to view with much sadness and dismay too many of our fellow citizens using the precious resources of our soil with reckless abandon, in order to produce food and fibre for our war effort. No one will say that the farmers of this county have not done a magnificent production job. We did produce and in spite of great handicaps in manpower and equipment, turned out during the war years, food in ever-increasing abundance. Surely it was necessary that we do this, but now that the war is over (or practically so) it is time that we count the loss and begin to plan to rebuild that which has been torn down.

While too many of our fellow farmers paid too little attention and failed to use ordinary prudence in protecting the welfare of the soil, we cannot say that of all of them. One of the bright spots in this whole period, one of the things that shines like a bright light 'mid encircling gloom, is the accomplishments of the 300 Mahaska County farmers who sent their acres to war, protected by contours, terraces, strip cropping, and better rotations and land use. If any group of citizens were to be selected in Mahaska County to be decorated, shall we say, "For meritorious conduct in line of duty," surely these would be the ones. Not only have they produced as much or more than their neighbors, but they have done it in more efficient and profitable manner and the casualty list (as far as the land is concerned) has been nil.

The commissioners would like to mention some of the obstacles to better land use that have been apparent to us during the 4 years of our existence. First and paramount, is the lack of education. We feel that if there were some way of bringing the benefits of soil conservation home to the farmer in a much more extensive way than we have used

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YOUNG IDEAS

wake up an old farm

By
Robert S. Whitaker

This pond saves time and labor. Young Hamric no longer has to pump all the water for his cows. He'll have some fish, too.

WESLEY Hamric of Hickory Plains, Ark., is only 27 years old. He's doing a better job of conservation farming on his 64-acre place than most men with more land and longer experience. Young Hamric is making a living for his family of five. He is also controlling erosion and building soil fertility, so he can get higher yields and increased income in the future.

Milk cows and row crops are Hamric's main enterprises. Wesley has 20 acres in corn and cotton, 10 acres in improved pasture, and the rest in unimproved woodland pasture.

NOTE.—The author is work unit conservationist, Soil Conservation Service, Des Arc, Ark.

Hamric clears poor-quality woodland, which he will convert to good pasture.

He started conservation farming a little more than a year ago. That was when he began noticing gullies beginning in his fields. His conservation plan, worked out with Soil Conservation Service technicians assigned to the Des Arc Soil Conservation District, called for correct land use, sound rotations, contour cultivation, and terraces to help stop the gullies.

Wesley grows Austrian winter peas for erosion control and soil building on his cultivated land. This year he made ten 500-pound bales on 10 acres. That's about twice what he produced before he began using the winter legume.

Wesley's conservation plan saves labor. He formerly had to pump water for his stock by hand. Now a farm pond furnishes the water without pumping. It was recently stocked with bream and bass. Pan-size fish should be available by late next summer. Wesley helps the fish grow by putting fertilizer in the pond.

As soon as he can get around to it, Wesley plans to clear most of his 32 acres of woodland pasture, leaving only enough trees for fuel. Thus far he has cleaned up 5 acres and has retired another 5 to pasture which formerly was in cultivation. The

latter 5 was on a rolling hillside where each rain caused severe erosion, but it doesn't wash now under its good grass cover.

A drainageway that has been too wet to cultivate crosses his cultivated land. He plans to retire that area to hay meadow.

The 10 acres of open pasture have been seeded to carpet grass, lespedeza, and white dutch clover. Wesley keeps seven cows and a mule on the pasture all year. The cows get protein feed at milking time.

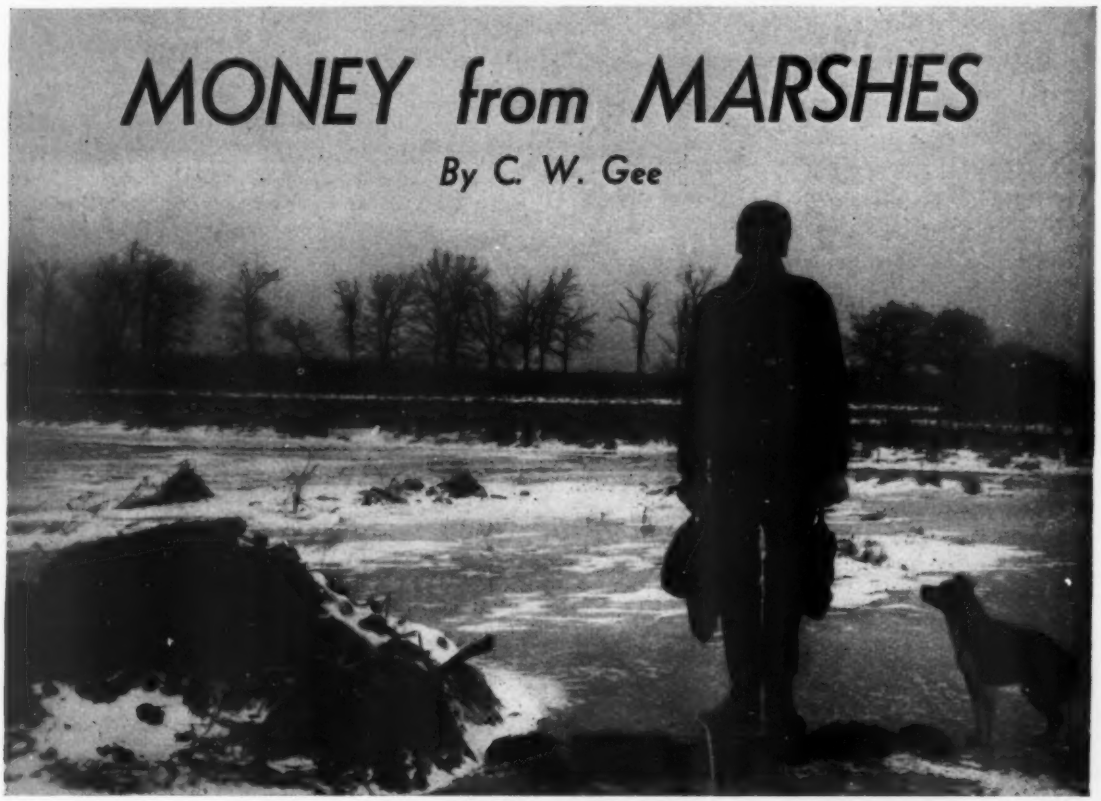
Wesley figures his total feed and hay bill at $200 a year. The milk which he sells to a cheese company and a creamery brings in around $500 a year. His family has all the milk it wants to drink. As the pasture improves, the hay bill will largely disappear.

A Little Rock dairy has extended its milk route past the Hamric home. Wesley plans to sell milk to the concern as soon as he can build a new barn with a concrete floor. He expects to produce a grade "A" product.

Wesley grows enough corn to feed out about three hogs each year. The corn has the benefit of Austrian winter peas which are plowed under as green manure each spring. "The way I'm handling my land now, it produces as well as it did when it was first cleared," says Hamric. "I'm going to keep on using peas or some other legume every winter. It pays."

MONEY from MARSHES

By C. W. Gee

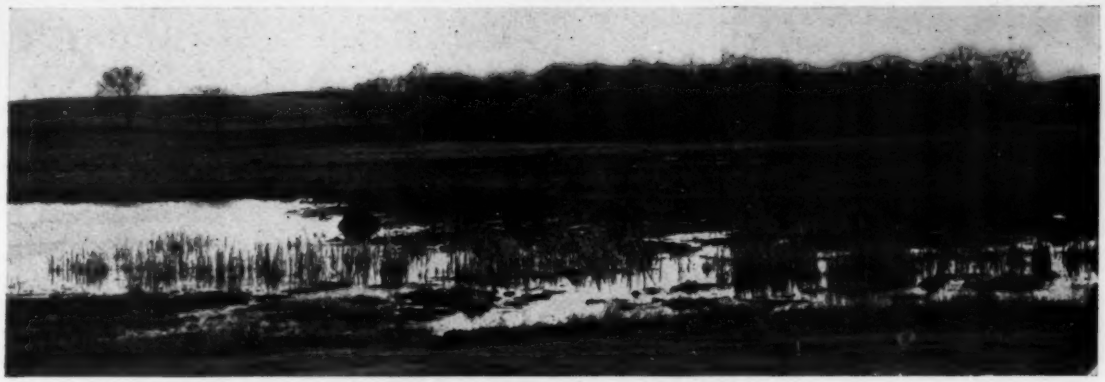


Francis T. Doyle harvests a rat crop.

WHEN Francis T. Doyle bought his farm near Prior Lake, Minn., back in 1941, he knew that one-fourth of it was "waste" land. Marshes cover 100 acres. Yet from this so-called waste land, Doyle has collected $2,425 during the past three trapping seasons. Doyle is a cooperator in the Scott County Soil Conservation District.

"I bought this farm in 1941," Doyle recalls, "but did not move on it until a year later. The previous owner wanted $16,000 for the 400 acres but I

NOTE.—The author is head, regional information section, Soil Conservation Service, Milwaukee, Wis.



Scott County marsh, typical of many in northern states; a source of farm income from muskrat pelts.

finally bought it for $12,000, which I thought was a fair price. I did not place any value on the 100 acres of marshes. I considered these areas as so much waste land."

Since then Minnesota has had three open seasons on muskrat. The first season, Doyle trapped approximately $775 worth of rats from his two marshes and collected an extra $150 by leasing the same land out to duck and pheasant hunters.

In 1943 he sold $725 worth of pelts and took in $150 more from the hunters. There was no open season on muskrats in 1944 but the hunting leases again paid Doyle $150.

During the 1942 and 1943 seasons, Doyle worked out a bonus system with his hired man. "We shared our trapping returns on a 50–50 basis," he said. "Needless to say, I was able to keep a hired man during those years when so many other farmers found considerable difficulty in holding their help.

"I made all of my own sets and took care of all the rat hides during the 1945 season," he said. "Trapping was not especially good but I could have caught many more rats if I had trapped the larger houses. It has always been my policy to leave plenty of rats. However, I don't usually leave as many as I did in 1945.

"My net income for 1945 was about $300 from muskrats and $175 from duck and pheasant hunting rights. I have already leased the property out for 1946 and my net income from hunting rights this year will be $225."

Doyle is no professional trapper, however. With the assistance of Soil Conservation Service technicians, he has worked out a complete farm conservation plan on his land, several miles south of Prior Lake. He regards wildlife as but one source of farm income, though an important one. He places wood lots in the same category.

In 1942, Doyle built a barn, using 21,000 board feet of home-sawed lumber and dimension stock which grew in his own woodland. This year he will use 10,000 board feet of home-sawed lumber to build a garage and machine shed.

"I feel that my wood lot is a good wildlife area, too," he said, "although I have never set a price on the skunk, raccoon, fox, and rabbits found there. They have provided me with a lot of recreation."

Setting a cash value on his muskrat-haven, is another matter. With fair luck, his marsh income should pass $3,000 this winter.

Both marshes are within a short distance of his improvements and on his own land. "The beauty of this is that I can take my own good time in trapping," he said. "All the trapping seasons come in December when farm work consists largely of doing routine chores. I then spend about 5 hours a day making sets and taking care of the rats."

In addition to being a district cooperator, Doyle is also a county AAA committeeman. He is well acquainted with such conservation practices as draining marsh land.

"Several contractors who own draglines and ditching equipment have stopped in and tried to talk me into ditching these marshes," he said. "I definitely would not drain them. Without putting a cent of money into the project I could easily have a net income of $9 or $10 an acre from the two

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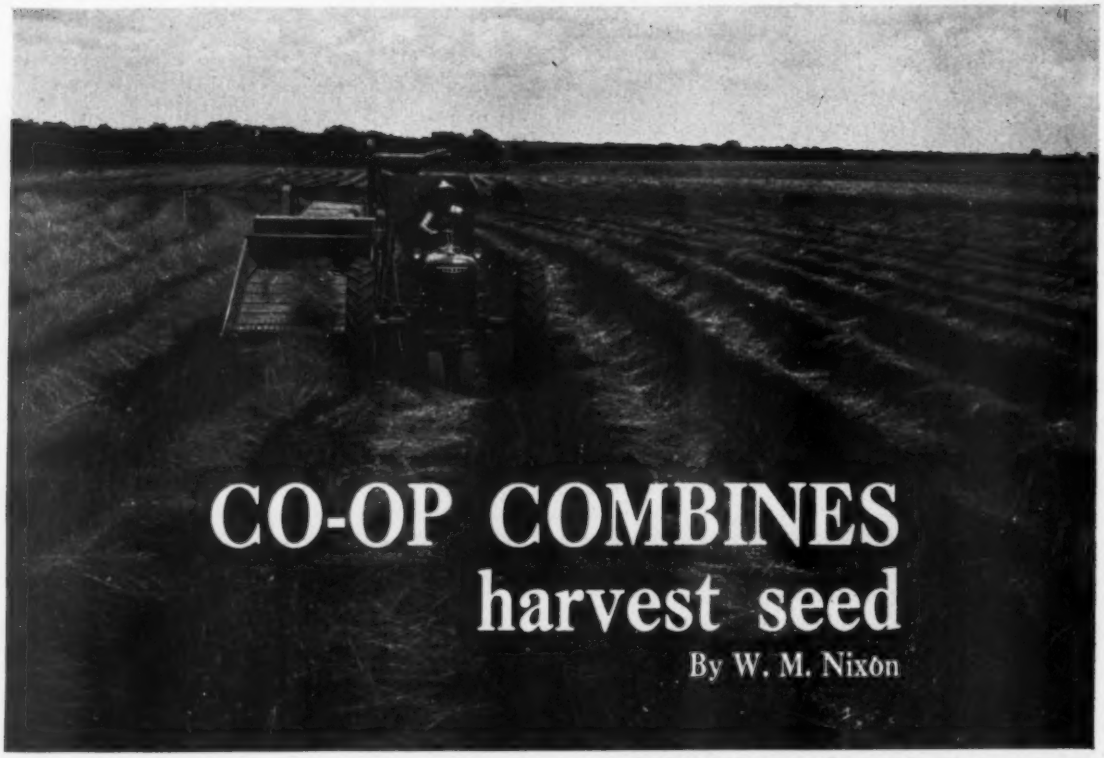

CO-OP COMBINES harvest seed

By W. M. Nixon

THE cooperative use of combines helped to overcome a serious obstacle to progress in 160-odd soil conservation districts in Texas and Oklahoma. The handicap was the lack of sufficient amounts of grass and legume seeds. Millions of pounds of such seeds annually are required to establish a protective vegetative cover on eroding lands and to increase soil productivity.

Millions of acres of eroded and depleted soil in Texas and Oklahoma must be returned to permanent vegetation. It has been demonstrated repeatedly that permanent vegetation put on unproductive cultivated land can turn losses or uncertainty into a good, dependable income.

Grasses and legumes are used also in a coordinated soil convervation program to provide safe disposal of surplus run-off water through vegetative outlet channels and meadow or pasture waterways.

The limiting factor in the widespread use of grasses and legumes has been the lack of certain seeds in commercial channels. In recent years many seed dealers have tried to meet the needs of

NOTE.—The author is chief, regional agronomy division, Soil Conservation Service, Fort Worth, Tex.

Combining hubam clover from windrows. P. B. Berry, Ellis County, Tex., estimated his hubam seed yield from this six-acre field at about 550 pounds per acre.

Combining hairy vetch and abruzzi rye for seed in Brown-Mills Soil Conservation District, Brown County, Tex. G. G. Goss, district supervisor, is on tractor. Yields ran 214 pounds rye seed per acre, 66 pounds vetch seed, on unfertilized land; 224 pounds rye seed, 620 pounds vetch, on fertilized land. Sale of seeds brought $18.87 per acre from unfertilized crop, $96.88 from fertilized. The Goss farm benefited also from green tonnage.

soil conservation district cooperators by stocking as many of the seeds as they could obtain. In most instances, however, the demand has exceeded the supply. In many districts cooperators were willing to plant grass and legume seeds to supply their own needs and those of other district cooperators, provided facilities could be made available for harvesting. In some districts there were no combines available for seed harvesting. Where there were privately-owned combines, they were usually tied up in grain harvesting. After studying this problem, soil conservation district supervisors felt that if harvesting facilities could be provided to the districts, grass and legume seeds could be harvested successfully and profitably. Success would encourage the planting and harvesting of such crops on a larger scale.

To fill this need the Soil Conservation Service in 1945 bought 40 combines and loaned them to soil conservation districts in Texas and Oklahoma. The district supervisors worked out a cooperative plan of operation, making the combines available to cooperators on reasonable time and rental schedules. The harvesting of more than 800,000 pounds of grass and legume seeds last year is convincing testimony to the success of this plan. Prospects are that several million pounds of seed will be harvested this year. The whole program of coordinated conservation has been given great impetus. Among the grass seeds harvested were bluestems, blue grama, hairy grama, sideoats grama, weeping lovegrass, blue panic, and Rhodes grass. Legume seed harvested included crotalaria, vetch, sweet clover, Singletary peas, blue lupines, and cowpeas.

While producing and harvesting these seeds to help in the conservation program and to improve their own lands, farmers found that they could materially increase their cash income by the sale of the seeds.

Another result of the success of seed harvesting is the purchase of combines by cooperators themselves who have seen how cash income can be increased substantially through the sale of seeds while at the same time the land can be improved through the use of grass and legume crops.

Soil conservatiton district supervisors unanimously agree that the loan of combines by the Soil Conservation Service to the districts has been a worth while undertaking. The plan has served: (1) to fill a need for grass and legume seeds when the need could not be filled in any other way, and (2) to demonstrate how the seeds could be harvested successfully so that farmers could carry on themselves.

Charles C. Smith, district conservationist at Alice, Tex., reports: "Loan of the combine to the district was valuable because the machine was used on small plots when privately-owned combines were busy with the grain crop. Also, the combine set a standard of performance not previously equalled. By properly equipping and adjusting the combine, demonstrators have been able to harvest seed in a clean condition, with little recleaning necessary. Most fields would not have been harvested but for the district combine."

Close-up shows how reel bats may be altered by addition of broomstraw, which increases efficiency of grass-seed collection.

W. R. Heizer, district conservationist at Dublin, Tex., reported: "The loan of these combines has advanced the district conservation work, especially in winter-legume cover crops and clover planting, for seeds have been made available when there has been a shortage. By having these seeds immediately available, many more cooperators planted cover crops last fall than ever before. Also the production of legume, clover, and grass seeds by local cooperators has been encouraged. Cooperators who used combines declared they were convinced that vetch, clover, and grass could be harvested successfully for seeds. We know of three new combines that have been purchased by cooperators who grow vetch and other legume seeds; we know also of several supervisors and other cooperators who will purchase combines when they become available.

"Use of the combines stimulated interest in soil conservation in general. There has been a notice-

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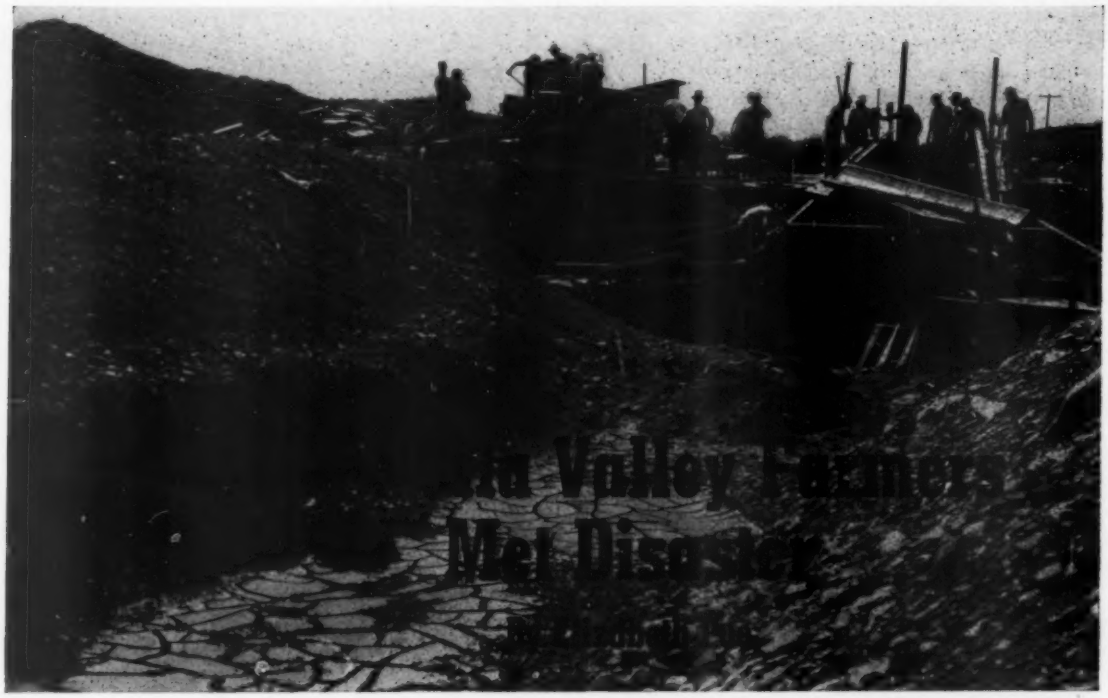


Reconstruction of a siphon heading on Butler Wash, near Safford, started soon after the September flood.

EFFECTIVE leadership by a soil conservation district enabled a whole farming community to recover from a flood that in September 1944 brought a $400,000 loss to crops, irrigation systems, livestock and other farm properties in the Gila Valley, New Mexico. The damage from flood and hail was the worst in 35 years.

The flood came at the time of year when the people prepare their land for irrigated pastures, fall grains, barley, and alfalfa, and profitable fall crops of sugar beet seed. Cotton had not been picked nor other crops harvested. It was the worst possible time for a Valley farmer to be without water, and the flood made almost 15,000 acres of rich valley temporarily arid. Structures were ruined on four canals which take water from the Gila River to the farms, and it stopped the water supply to two other canals below the flood area.

Three thousand acres of cotton valued at $70,000 was destroyed by flood. Hail, which came the size of marbles, ruined $68,000 worth of cotton. Damage to livestock buildings and equipment and other farm properties was estimated at $25,000. When the canals that bring water from the Gila River to the fertile fields were inspected, it was found that $70,000 would be needed to put them back in working order.

A survey of the damage was started as soon as the flood was over. A detailed analysis of the type of damage, the number of acres of each crop ruined and what was lost was made immediately by Mervin H. Wallace, conservationist for the Soil Conservation Service stationed in Safford. Even before the survey was finished, action started. The supervisors of the Gila Valley Soil Conservation District, themselves farmers who had suffered along with everyone else, called the people together for a meeting. Representatives of the major canal companies attended the meeting, together with people from the Farm Security Administration, the Disaster Loan Corporation, and other Federal agencies. The Soil Conservation Service, however, was the agency equipped to do the most. It could lend equipment and supply engineering advice for reconstruction.

The Soil Conservation Service office above the Safford post office, where the meeting was held, was packed.

"We've got one tractor and a dragline. They're both broken down," explained the district super-

NOTE.—The author is head of Press and Radio Section, Soil Conservation Service, Albuquerque, N. Mex.

visors. "We must organize to get every bit of equipment available."

And so an equipment pool was started. The Graham County Commissioners said they would turn over the county road equipment to the district. That meant one crawler tractor with a bulldozer and a power shovel. Four bulldozer outfits were available from private owners. Two neighboring soil conservation districts sent in one tractor each.

With this much equipment at hand and the canal companies organized for action, the district supervisors were in a position to begin. At the meeting everyone agreed to let the district supervisors coordinate all equipment and work out a priority system for its use. The plan was to put the canals that needed the least work into operation first. After the canals were opened, the equipment was to be used on farms to clear away the brush and boulders and silt deposited by the flood. The land to be planted in fall crops was marked for first clearance.

Things worked out that way, and by October 12, ten days after the meeting, the Union canal was back in operation. Nine days later the Highline canal was carrying water.

The disaster had proved that channels and structures designed to take care of ordinary floods were inadequate. This was particularly true of channels supposed to carry the flow of side washes from the hills to the river. Over 10,000 feet of one canal was entirely filled and several siphons were plugged up. At one point it was decided to abandon 2,100 feet and build a new canal. Over 27,000 cubic yards of material had to be moved to do it. At another point a wash roared down a mountain canyon, fanned out at the mouth and spread over seven farms.

Siphons six feet in diameter are being constructed to carry one canal under three washes. The washes are being channeled from the hills on the upper side of the canal down to the river on the other side. This precaution will prevent normal floods from doing similar damage. For two long stretches, 2,000 and 1,300 feet, the canal had to be completely relocated. The cost of reconstruction on but one of the six canals amounted to $50,000.

Right-of-way squabbles developed over the relocation of some of the washes, and the Gila Valley Soil Conservation District supervisors were named arbitrators to settle the disputes, because the board was considered a disinterested body with sufficient knowledge of conditions to judge fairly. Again, when $1,500 was donated by a private company to help out in reconstruction, a survey of all agencies represented in Safford revealed that none of them was in a position to parcel out the money to the farmers who needed it most. When the company representative approached the district, the supervisors convinced him that a new tractor, to be used all over the district, would be of greater and more lasting benefit to the area than relief money doled out to a few who needed it more than others.

Although Federal loan agencies approve loans to the stricken farmers, nobody took one. The district rental policy on equipment remained the same throughout the emergency, and the county and the private owners who loaned equipment set up their own rates for rentals. The canal companies received from $1 to $2 an acre from the AAA for new improvements made on the canals, but no money came for the repairs.

The only farmland in the wake of the flood that was not badly damaged was 800 acres of irrigated pastures planted to improve grass and legume mixtures that actually thrived on the inundation. The planting of these pastures to improved mixtures has been promoted by the three Soil Conservation Districts in the Safford and Duncan area for several years because of their excellent erosion-control and feed-production abilities.

By 1945 there were only 12 acres of land in the flooded valley that hadn't been restored to crop

(*Continued on page 279*)

A siphon six feet across was installed on Graham Wash after destruction of the old flood-control structures.

Nature Planted Legumes, too

By Donald R. Cornelius

Editor's note.—This article should be regarded as a preliminary report. The information is largely observational. Basis has been established for further study of these potentially important plants. Still lacking is a sufficient supply of seed; also, adequate knowledge of correct cultural practices.

NATIVE legumes deserve more consideration. In the Great Plains, they are thought to give to native grasses the same sort of boost that alfalfa and the tame clovers give to tame grasses. At least that is indicated at the Soil Conservation Service nursery at Manhattan, Kans. Native-grass mixtures planted there made more vigorous and productive stands when seeded with a legume.

One mixture—big and little bluestem, switchgrass, and side-oats grama—was seeded on sloping upland plots in 1940. Round-headed bush clover *Lespedeza capitata* was included in some of these plantings. Last year the plots which included bush clover yielded 7,951 pounds of forage per acre—6,965 pounds of grass and 986 pounds of clover—compared with 6,344 pounds where clover was not used.

Similar tests with partridge pea *Chamecrista fasciculata*, an annual, were made more recently on thin, eroded, upland clay soil at the station. This legume is a rapid invader on road cuts, sand dunes, badly eroded land, and other areas very low in fertility. Where it was included in mixtures, the grass grew more rapidly during the first year and there were fewer undesirable weedy plants.

These performances seem important, since increasing the density of stand and growth of grass increases its ability to protect the land and conserve water. This also makes the grass more worth while in terms of pasture, hay or seed. There is a close relation between the popularity of grass and its ability to pay its way.

Little attention has been paid to native legumes theretofore, even though a great deal of progress has been made with the introduction of new grasses and the harvesting and planting of native species. This was due partly to the lack of seed and information on seed treatment. Partly responsible, also, was the failure of many ranchers to recognize the value of the native legumes. They classed as weeds all plants other than grasses.

Numerous native legumes are to be found in meadows that have never been plowed and in areas of virgin prairie along roadsides and in cemeteries. They differ widely in their appeal to livestock. The several species of wild indigo *Baptisia* and wild alfalfa *Psoralen floribunda*, for instance, are grazed very reluctantly or not at all by cattle, but sheep have been known to kill out wild alfalfa in 3 years. Some of the legumes are so well liked that cattle are likely to graze them out of existence, unless it is prevented. Still others, such as the poisonous locoweed *Oxytropis lambertii* and wooly locoweed *Astragalus millissimum* are to be avoided, and milk vetch *Astragalus racemosus* is dangerous when grown on selenium-bearing soils.

It has been noted, too, that native legumes come in as quickly as, and sometimes before, grass on abandoned land that is going through the time-consuming process of natural revegetation. This is especially true of severely eroded land. There, such legumes as tick trefoil *Desmodium illinoense*, partridge pea, prairie clover *Petalostemum multiflorum*, round-headed bush clover, dalea *Parosela enneandra*, and many others will be found. They evidently are the first step in building up nearly infertile soils. Some are best adapted to sandy land, among them prairie bird's-foot trefoil *Lotus americanus* and wild bean *Strophostyles helvola* and *Strephostyles leisperma*.

One in particular—leadplant *Amorpna canescens*—seems to thrive on most sites and to escape too close grazing. It is a low-growing shrubby plant, never too coarse or weedy for mowing but coarse enough that stock do not graze it too heavily. When cut annually, the stems are small and make forage of good quality.

The native legumes seem to function much as tame legumes, with which farmers are generally

NOTE.—The author was formerly associate agronomist, Soil Conservation Service Nursery, Manhattan, Kans. He is now with the California Forest and Range Experiment Station, U. S. Forest Service, Berkeley, Calif.

Native grass-legume mixture planted April 1939 on eroded upland near Manhattan, Kan.; photographed October 1945. Seed was natural mixture from prairie combined in Payne County, Okla. Grasses are little bluestem, switchgrass, Indian grass, and big bluestem. Legumes are round-headed bush clover (*Lespedeza capitata*), bush clover (*Lespedeza stuveii angustifolia*), and tick trefoil (*Desmodium illinoense*).

familiar but which cannot withstand drought. They are nitrogen producers, of course. They usually go deeper for their food and moisture than the grasses and are thus not fiercely competitive. And apparently they are high in protein, minerals and vitamins. As an illustration, a variety of ground plum *Astragalus plattnesis* collected at Towner, Colo., last June was found to contain 19.8 percent protein. This is well above the 6 percent protein content of buffalo grass at that time of year.

Their time of growth varies, too. Ground plum starts growth fully five weeks before the warm season grasses and is usually in full bloom when livestock are turned out to grass in spring. In contrast, prairie clover matures around Manhattan about frost time in early October. Its use comes late in the season. An area of prairie clover was located in a pasture at flowering time in September; when the seed was to have been harvested a month later, the tops had been eaten and the seed supply was gone. It is probable that the native legumes supply some nutrients and vitamins at times when the grasses are low in them.

Production of native legume seed probably will have to be in nursery plots or on farm seed plots. The plants under natural conditions are scattered and harvest of the seed is tedious and expensive. Furthermore, the problem of seed treatment has only partly been solved. To date, the three bush clovers *Lespedeza capitata*, *Lespedeza virginia*, and *Lespedeza stuveii* and one variety of ground plum *Astragalus crassicarpos*, have responded to scarification just before seeding. The process is to soak the seed 15 minutes in concentrated sulphuric acid, wash it in clear water, and dry it. Some mechanical method may be adapted in time.

Testing of native legumes and development of seed treatment are just begun, it is true, but the prospects are promising. It may not be too long before a farmer or rancher will be able to select for seeding those native legumes which suit his purpose best. Judging from what has been seen at the Manhattan nursery, this will pay in the production of more vigorous stands to protect land and conserve water, and in the production of forage.

What of the Aleutians?

Albert M. Easterday Adds an Interesting Postscript to Mr. Rockie's Article

THE JANUARY issue of *Soil Conservation* carries a most timely article on agricultural possibilities in Alaska. Naturally, covering such a wide field, descriptions were brief. The writer would like to supplement the information on the Aleutians by some observations of his own.

Much more has been said against the Aleutians than has ever been said in their favor. These criticisms may be partly due to the original habitat of the critics. If the critic comes from a land graced by forests, he is quick to note the lack of trees on the Aleutians. Likewise, if he comes

NOTE.—The article "What of Alaska?" in the January issue of *Soil Conservation* evoked much discussion. Here reproduced is a letter to the Editor from a former engineer in the Soil Conservation Service. Mr. Easterday went to Alaska in 1943 as engineer on erosion control for airports. At present he is with the War Department's office of the Division Engineer in Omaha, Nebr.

from a land of gentle breezes and sunshine, he may make the worst of that land, fog-draped during the summer season, or of the occasional fierce blasts of winter. However, the native Aleuts were happy on their grass covered islands where often only the horizon limited a man's view and the seasons brought an abundance of choice seafood and fine furs.

While performing duties incident to our recent conflict, the writer had the opportunity of observing some of the more important islands of the Aleutian chain. Usually this far-flung strip of America appears as an insert on a map of Alaska and few observers realize its magnitude and extent.

Generally speaking, the Aleutian chain enjoys more moisture than the great central valleys of Alaska, without the severe cold of winter or the extreme heat of summer. The rainfall is ample to produce a lush growth of native grasses, yet without the heavy precipitation common to southeastern Alaska. However, neither the Russians nor the Aleuts seem to have been farmers but rather, they were fishermen and fur hunters. These islands seem to have the same possibilities of the mainland and the added advantages of a more even temperature and no permafrost. The temperature ranges from about 15° to 60°.

Although of volcanic origin, the soil is a combination of volcanic ash, glacial silt, fine windblown sand, and humus. When plowed up and damp, this rich dark brown soil emits an odor reminiscent of a feedlot on a warm, rainy day.

Beginning with Unalaska, this chain sweeps farther south than Prince Rupert, British Columbia, and in a long graceful curve sweeps north and west to about 172°30′ east longitude, only a few hundred miles from the Russian Siberian mainland. In 1805, we are told, the Russians made an attempt to start trees and, although they are still growing on Unalaska, no seedlings were produced. Likewise, the trees planted around the old Russian stone church on Atka were growing nicely until they were killed by the fire which destroyed the building in 1942 or 1943 when we were carrying out a scorched-earth program.

Prior to Pearl Harbor, a reportedly prosperous sheep business flourished on Unalaska; however, all I saw were some drift fences and wonderful grass pastures, but no sheep. The native grasses have been improved by addition of domestic timothy.

The first island of importance beyond Unalaska is Umnak, which is about 70 miles long and about 25 miles wide. The rim of a vast volcanic crater some 15 miles across is topped by Mountain Tulik which dominates the scene. This island is unique in that it is really a great cinder pile with just enough soil to support a fair covering of grass. Calamagrostis, timothy, beachrye, and other wild grasses were observed. Although unsuited for cultivation, it is wonderful pasture. Some 20 years or so ago a small band of caribou were released there. When our armed forces took possession in 1942 there were about 4,000 head. Some inroads were made during the early days of occupation but now, due to active intervention on the part of the Alaska Game Commission and cooperation from Army officials, the caribou are again being protected. On this large island are thousands of acres of excellent grass and at the present time overgrazing is no problem.

The caribou enjoys a dense oily coat of fine hair which effectively sheds the rain. Some of our northern breeds of cattle should also thrive under prevailing Aleutian weather conditions. The natural terrain provides wind breaks against the much publicized Williwaw. There are no predators on any of the Aleutian chain larger than a fox and fences are necessary only as a control of grazing.

Similar conditions prevail out as far as Adak. Although somewhat mountainous, wide level areas could easily become hay meadows. However, the damp climate at harvest time makes it difficult to dry hay. Although some hay is cured at Anchorage by the Norwegian method of piling a few forkfulls up around a stick stuck into the ground, the method is unsuited for large-scale operations and siloing would probably be the solution to this problem. Although Adak has definite possibilities for the cattle business and the level areas would be suitable to agriculture, the writer knows of no effort to plant gardens. Experimental plots of grass gave satisfactory results under very unfavorable handicaps. Dust from a paving mixer plant fell on the plots almost continuously but in spite of it, the grass grew.

Amchitka lies well to the south along the chain and rises about 200 feet above the sea. The surface is rolling or gently sloping and supports a wide variety of grasses which have grown, died, and decayed for countless years. The Russians and Aleuts who had occupied the village were

primarily fishermen and fur hunters. No evidence of gardens was observed but with soil capable of producing such luxuriant stands of grass, hardy vegetables should do equally well.

Attu and other of the far western islands produce rank growths of grass and some varieties of berries grow in abundance but deep snows would necessitate winter feeding of livestock. Most of the beautiful flat valleys would require draining before extensive tracts could be turned by the plow. They are now natural hay meadows.

All these islands seem capable of producing sustenance crops of vegetables for those resolute souls who would make a fortune at fur farming or fishing. But it would appear that neither the Aleutians nor Alaska offers much to the big-scale agriculturist because of a limited market.

Even the Matanuska Valley felt the pinch of a circumscribed market before the war flooded Alaska with soldiers and civilians brought there by military activities. So long as the mainland is heavily populated with military personnel, market gardening, poultry raising, and dairying will find a lucrative market; but the peacetime future would not seem too attractive for such ventures on a large scale. All the markets must be home markets.

Both fishing and fur-farming offer profits to those who have the initial capital and willingness to face frontier conditions. Fishing, especially, is seasonal and the area would offer little in the way of enterprises or employment during the rest of the year.

Hence, a poor commercial market for the farmer and market gardener exists. Likewise, the stockman would enjoy low production costs on the Aleutian chain, but he too would be confronted with the problem of a market. However, a limited local market may be produced by the development of both fisheries and mining to their fullest capacities.

It is rumored that valuable minerals have been found along the rim of the crater on Umnak, and that the delicious crabmeat the Japs sold us before the war came from the Aleutians and, very likely, from Adak.

It would seem that the Aleutians deserve the honor of being thoroughly investigated and that they may hold far more possibilities than anyone realizes.

MONEY FROM MARSHES

(*Continued from page 271*)

marshes any year there was an open season on muskrats. I often wish I could parcel out my entire farm on the same basis. It would bring me a comfortable living with a great deal less effort than I put into my regular farm work."

Dewey V. Hahn, work unit conservationist in the Scott county district, points out that Minnesota, Michigan, and Wisconsin have thousands of acres of marsh land similar to Doyle's. "Many other farmers could add hundreds of dollars to their cash incomes," Hahn said, "by purchasing some steel traps."

CO-OP COMBINES

(*Continued from page 273*)

able increase in the number of visitors to the soil conservation district office who seek assistance in pasture management and inquire about seed harvesting and seed sources for revegetation of some of their land."

With an increasing supply of grass and legume seeds now available, the soil-conservation district program can move forward at a faster pace.

WAR PRODUCTION

(*Continued from page 268*)

before, much more could be accomplished. The Extension Service and the Farm Bureau, the Vocational Agriculture School in Oskaloosa, the various service groups and, of course, the members of the Soil Conservation Service in Mahaska County, have all done a wonderful job and perhaps in the near future, as more talent and we hope more funds are available, this effort can be increased.

GILA VALLEY

(*Continued from page 275*)

production. The 8,300 acres directly affected by the flood were producing food, and the 6,000 acres indirectly affected when the water supply was cut off were back in production. The job was a speedy one that required re-incorporation of two canal companies. It was finished in record time, and the people of the Gila Valley are benefitting today because they delegated authority and worked together to get the job done.

A Look at Paricutin

By
W. C. Lowdermilk
and
Reed W. Bailey

Close-up of volcano fumaroles; lava, still warm, in foreground.

ON FEBRUARY 20, 1943, a volcano burst out of the cornfield of farmer Dionisio Pulido near the village of Paricutin in the State of Michoacan, Mexico. Violent earthquakes had given warning. But the village folk of this picturesque region of corn and pine were not prepared for what was to come, because in their memory no volcano had occurred before.

NOTE.—The authors are assistant chief, Soil Conservation Service, Washington, D. C., and director, Intermountain Forest and Range Experiment Station, Forest Service, Ogden, Utah, respectively. The material for this article was obtained while the authors were on leave from the Federal Government, with travel expenses paid by the National Research Council.

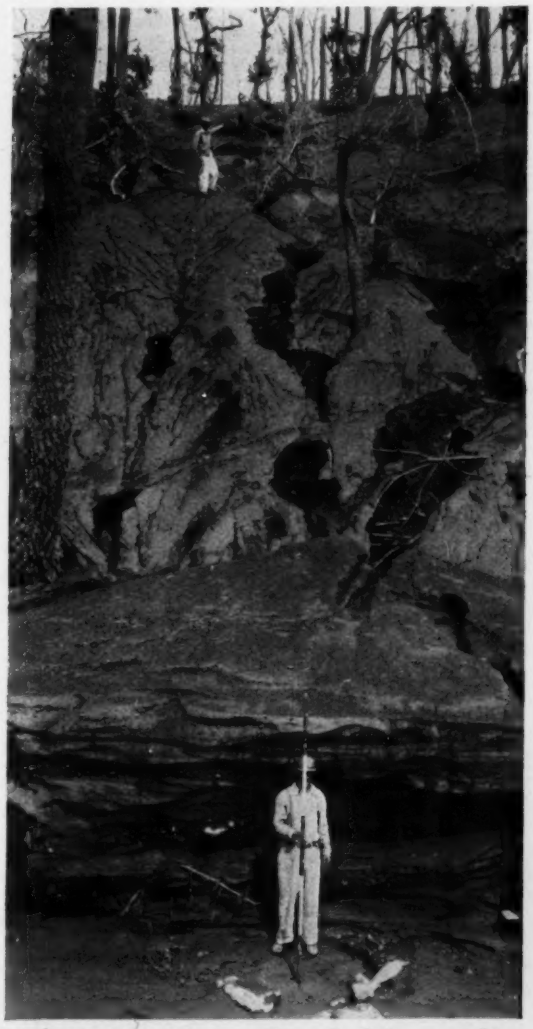
Their first knowledge of what was happening came with the thing itself, as they watched great puffs of smoke and fire shoot skyward, throwing out great showers of volcanic bombs. (In 10 months' time they built up a cone 1,500 feet high.) Fine grained volcanic "ash" rode the columns of violently rolling, turbulent clouds. Then, as the clouds cooled off, ash rained down over the countryside. Some ash fell as far as Mexico City, about 200 miles away. Near the volcano the ash

At Narito, accelerated run-off from the ash-covered landscape has cut a gully 25 feet deep through the recent ash deposit of less than three feet into older deposits of ash.

layer increased rapidly throughout the remainder of 1943, but ash fall diminished thereafter.

Lava, as a grayish, moving mass of thick, crackling, crumbling rock, crept forth from openings near the growing cone. As flakes of rock fell away from the "front," glowing red showed forth in the awesome flow. Slowly but inexorably this grayish diabolical river of molten rock moved down slope. It spread and enveloped fields, trees, and all but a little of the village of San Juan de Parangaricutiro. Only the tower of the village church still stands above the jagged mass of lava beneath which the village lies. Later on, the tide of lava swallowed up the village of Paricutin.

Such were some of the accounts of what happened, as told to us by villagers of the volcanic area, and two officials of the Mexico Soil Conservation Service. We were there at the invitation of Dr. Richard E. Fuller, chairman of the National Research Council Committee, to collaborate with the Comision Impulsora y Coordinadora de la Investigacion Cientifica de Mexico in the study of Paricutin. Sr. Engr. Patino, director of the Departmento de Conservacion de Suelos, collaborated with us in the study and assigned Ing. Jose Navarro y Samano and Ing. Davio Llerena Lanzagorta to carry on field work with us. The laboratories of the Departamento de Conservacion de Suelos made analyses of samples of ash and



Gullying of slope in forest. Storm floods have cut channels below original level.

Milk cow, brought back by villagers, grazing on new stands of Bermuda. During dry season in winter considerable wind erosion occurs, evidenced by hummocks protected by clumps of this grass.

determinations of laden flood waters. This report covers only the more general aspects of the spectacular examples of erosion that we found had taken place, and were taking place during our study of the area about the volcano, as well as the effects of ash-laden floods on irrigation works in the Los Reyes Valley.

From the beginning of the eruption and during our field work out from the Caseta, volcanic ash fell on the countryside as heavy black snow that would not melt. It overturned trees, bent others to the ground, and broke brittle branches. Forests nearby were heavily damaged. Grass was smothered, depriving livestock and game of forage. Fields that make up about 30 percent of the land area, and lie chiefly in valley floors, were covered to depths that stopped the growing of the usual crop of corn. The livelihoods of villagers immediately about the volcano were endangered. They fled Paricutin and San Juan de Parangaricutiro because of lava flows and were resettled by the government elsewhere. But villagers of Angahuan and Zirosto refused to leave their homes. They resorted to other occupations for wages to buy their food. A great influx of tourists gave employment to inhabitants of Angahuan, whereas those of Zirosto were employed on repairing roads and in hewing and delivery of railroad ties out of the surrounding forests. All look forward to a time when the ash-covered fields may be reclaimed for growing food crops again.

The volcano may be a new event to the local inhabitants, but it is merely an incident in the geological history of the country. The landscape east and west, north and south of Paricutin, is made up of hundreds of volcanic cones of such volcanos of the past—some larger, some smaller. From their flanks volcanic ash had been washed and deposited to make charming intermountain valleys in some of which nestle charming lakes, as at Patzcuaro. The pine forests that make up the dominant type of vegetation of this area came back again, covering the country. When man spread into this region, the forest was cleared away on corn, and little else.

about 30 percent of the area for the cultivation of

It was into this land of landscape, on the western edge of the central plateau of Mexico that rises to 7,000 to 8,000 feet in elevation, that the ancestors of the present inhabitants came long ago to work out their living. It is a region of summer rains, with dry winters. Indian corn-maize was the principal food crop then, and is so today. Forests were cleared away from valley floors for crops. The people live in villages of wooden houses of an unusual design. House walls are sturdy of hewed thick plankings, and roofs are steep and covered with pine shakes. Some anthropologists suggest that the steep roofs, unlike those in other parts of Mexico, indicate that early inhabitants, possibly forerunners of the present Tarascan people, had learned from the fall of volcanic ash to pitch their roofs sharply.

Corn is grown year after year until production drops too low to pay for work and seed. Fields are then let lie fallow for a year or more before another crop is planted. Vegetables, squashes, peppers, and the like are grown on protected sites about the villages. This is a land of corn and pine—and volcanos.

The Paricutin volcano is a source of interest in several fields of knowledge. For the first time, scientists have been given a chance to follow the life history of a volcano from birth, so to speak. The volcano is still active according to last reports. While the explosive intensity has waned, new lava flows have taken place in the month of April.

At the time of our study of erosional phenomena in the summer of 1945, explosive activity had waned intermittently. For the first 3 days of our studies, activity was not great. But later the volcano put on a great show. We stayed in the "Caseta" (little house) of asbestos walls and roof, about 3 miles from the cone. Frequently at night great roars of blasts from the cone would awaken us to look upon a hellish display of "fire and brimstone." Great blasts of gases and streams of glow-

Los Reyes Valley produces bananas, coffee, mangoes, and sugar cane. But now the sugar crop fails, because of the damage to the irrigation system by floods from the Paricutin area.

ing volcanic bombs were shot high into the air. Bombs formed fiery arcs as they showered down some to fall back into the cone, others to roll down slope as fiery run-off. We seemed to be watching the making of a world. Here were unleashed forces of many kinds—physical, chemical, and electronic. Lightning flashes from time to time lighted up rolling turbulent columns of ash-laden vapors. The earth's surface quivered in its spasms, erupting tremendous jets of gases.

The venerable geologist of Mexico, Dr. Ezequiel Ordonez, has followed the eruption closely from the second day and has estimated that on the average the water vapor in gaseous clouds shot forth in the early stages of the eruption was equivalent to a flow of water of 1 cubic meter per second, or a stream of 35 cubic feet a second, of magmatic water. This is new water formed out of the molten rock that sees the light of day for the first time and is added to the sum total of the earth's store of surface waters.

Other gases made up a small part of the impressive column of cumulous-like clouds that moved away from the volcano. Whitish and bluish-white

Where ash is fertilized, the Tarascan Indians have grown corn. Other nearby fields are still bare.

clouds about the cone indicated gases of hydrochloric acid and of ammonium chloride. Sulphur fumes were scarcely noticeable from fumaroles about the cone.

We were interested primarily in the dynamics of the spectacular erosion that occurs in the covering of volcanic ash. Space here permits only a general description of "ash erosion" and some of its consequences locally and down in the Los Reyes Valley, about 25 miles away.

Nowhere had we seen all kinds of erosion so fantastically demonstrated as in the ash deposits about the volcano. Sheet erosion, rill erosion, gully erosion, steam capture, mass movement, mud flows, sapping, colluvial erosion, and wind erosion—all these forms in miniature and in large were found in hundreds and thousands of examples.

The hydrology of the area has been much changed by the deposit of ash. Volcanic ash is assumed to have a high infiltration capacity. Villagers reported that since the ash fell springs have burst forth in new places and old ones flow stronger. This would suggest that more water is percolating through the "ash mantle" than in prevolcanic days. Yet it seems that either run-off has increased, or its erosive power.

Rill and gully erosion is far greater than in surrounding areas little or unaffected by the fall of ash. Gullies have been cut through the new ash layer, and down into the old soil sometimes to considerable depths, up to 25 feet.

No measurements are available to determine whether the run-off which caused this gullying is greater than before the eruption. New moisture added at the rate of 1 cubic meter per second would add very little to total rainfall of the region. Precipitation records at towns nearest the volcano show no significant changes in rainfall before and after the eruption. Such spectacular erosion, however, calls for an explanation.

Where the fresh ash layer is totally bare, as near the volcano and in open fields where all vestiges of crops have been covered, sloping surfaces were cut by erosion rills closely spaced. But in forests where leaf-fall had covered freshly fallen ash to form a new forest litter, little rilling was in progress following leaf-fall where the ground surface was covered. Storm runoff from litter covered surfaces no longer cut rills, but as it flowed across bare fields down slope picked up loads of ash and eroded down into underlying soil.

During a heavy rainstorm we noted how volcanic ash surfaces absorbed rain as it fell. After a time slumping of ash on lower slopes occurred, apparently caused by an accumulation of water in the ash faster than it was percolating to greater depths. These slumps behaved as small mud flows. Out of these slumps, water drained from the ash and started streamlets that coursed down slope to form rills. Head cutting of rills worked up slope near to the dividing ridge. On gentler slopes rilling was not noted nearer than 10 feet of the flattish ridge top, but on steeper slopes rills approached nearer the divide.

Once rills were cut they became drainage channels for surface waters as well as for escape of perched water tables in the mass of ash. Further erosion with stream capture enlarged some to form larger rills that in time became gullies. Run-off accumulated from drainages of several acres cut great gullies through the ash layer into former soil surfaces.

One thing that puzzled us was the way the water accumulated in the ash near the surface as perched water tables during a heavy rainstorm. This suggested that the rate of percolation to greater depths was less than rates of infiltration at the surface. In former farm fields where the ash covered a soil of fine texture, it could be assumed that rates of water intake by the underlying soil would be less and cause the formation of a perched water table. Yet these perched water tables occurred on hills and mounds of fresh ash. Layers of ash up to 20 feet deep about the volcano would also allow for the accumulation of more water than usually fell in one storm, which during our observations was not greater than 2 inches. Compaction of the ash by weight of overlying material may reduce percolation rates of water but this would not necessarily cause perched water tables. No, these fantastic patterns of rills and gullies on all sloping surfaces were brought about by other causes.

Much more information is needed on intensities of rainfall infiltration and percolation rates before we can state the causes with exactness. Yet our field observations suggest a probable reason for such acceleration of erosion. Reduced transpiration loss from the ash because of its barrenness of vegetation would let a greater quantity of water accumulate in the ash.

Absence of vegetation to exhaust the water-holding capacity of the ash mantle would in this way add to the amount of run-off from rains. Be-

Lava flows have crowded streams out of their channels, and storm floods skirt the flows, cutting into the ash. This flow contained more than 50 percent by weight of ash in suspension.

Ash about the volcano exhibits a fantastic array of erosional forms. Here, surfaces without benefit of vegetation are subjected to erosion in the raw.

low the layer of surface evaporation the mass of ash holds water at its maximum moisture-holding capacity. Any water added in a rain after replenishing evaporation losses from the surface 4 to 6 inches, as based on other studies, would percolate no more rapidly than the least permeable layer beneath. With differential percolation rates in the underlying layers, moderate rains might well cause overcharging of the ash with water and run-off through rills and gullies.

Fresh ash contained a strikingly large percentage of total clay in mechanical analyses—from 5.14 to 12.14 percent. This high content of clay was consistent in ash fall near the volcano as well as several miles distant. According to Stokes' Law, larger particles fall more rapidly than fine. Large ash particles fall out of turbulent vapor clouds more rapidly than very fine particles which may remain in suspension for long periods of time. Differential rates of fall, however, are interrupted by rains that bring down from time to time finely divided dust that otherwise would remain long in the atmosphere. Ash fall under these conditions forms layers of coarser material covered with thin layers of fine textured material that we suspect change in important degrees the rate of infiltration. Partial sealing of the ash surface by the layering of clay fractions may well increase run-off coefficients of heavy rain and within the mass of ash cause the building up of perched water tables. Both functions would cause rilling and greater surficial run-off and may well account for accelerated erosion of the ash.

Moreover, the ash lacks cohesive materials, and has single grain structure. Surface flows pick up capacity loads rapidly to cut rills and gullies. Also, streams armed with ash are abrasive agents to cut and carry material out of the ash layer and underlying soil.

In those areas where forest trees were not killed and dropped layers of needles on fresh ash, we found and studied instructive contrasts in erosion within such forest stands and in adjoining open fields. A slope draining into Narita Barranca was studied in detail. In the slope transect of 900 feet, gradients varied from 3 to 35 percent. It was steepest from the summit. The upper third of the slope was covered by a young forest of pine with 300 trees (d. b. h., 8 inches) to the acre. The trees had been little damaged by an ash fall of 8 to 9 inches. The ash layer under the forest had been heavily cut with erosion rills before the fall of pine needles that formed a new layer of forest litter. Thereafter, little cutting took place in the forest stand.

Below the forest lay open fields that had been cultivated to corn before the volcanic eruption. The ash covering of the field was deeply cut by rills, many of which were cutting into the underlying soil. A transect across the slope showed 37 percent of the area was in rills. Erosion was still active on the upper slope, particularly just below the forest, where run-off from the new forest litter quickly picked up its load of ash and soil. Further down slope as the gradient flattened out, transporting power of run-off was lowered and deposition of ash took place.

Further away from the volcano where the thickness of ash was less than 6 inches, vegetation continued to grow in forest stands and to lay down ground litter that soon practically obliterated evidence of ash fall. But in bare fields erosion was active, unless slopes were nearly flat. Where forests had been damaged by heavy ash fall and leaf litter was covered by later ash falls, gullies had cut deep into the ash and underlying material and were still active.

We took every opportunity to observe and sample storm run-off and its burden of ash. On one such day west of Zirosto village we witnessed a large flood from a torrential rain falling back in the ash-covered mountains. The angry flood was steely black and flowed as a heavy liquid without foam. We watched and photographed a standing wave of 10 to 15 feet high. So powerful was this flood flow that banks quivered under impacts of the swirling current with suspended load of 64 to 65 percent by weight according to our samples, and with a density approaching 1.8 or nearly twice as heavy as water.

Such a flow had damaging effects in lower lying agricultural valleys. We made a 3 days' horseback trip to Los Reyes to investigate effects of floods of ash laden waters draining the volcanic area.

Los Reyes lies in a beautiful valley at about 4,000 feet elevation ringed around by old volcanic cones and the escarpment of the plateau on the east. The climate is near-tropical. Bananas, coffee, mangoes, and citrus fruits are commonly grown. But it was to sugarcane and its sugar that the city of Los Reyes owed its prosperity until the volcanic eruption. One sugar mill was completely out and the other ran at much reduced capacity.

Forests suffered severely from volcanic bombs and ash. Branches were overloaded and broken off, vegetation smothered, gullies slashed.

Labor dependent on the sugar enterprise had to leave Los Reyes for want of work. A depression had settled down upon this picturesque town, where people talked most about the time when the irrigation of the valley would be restored.

Here are the events that led up to the depression:

Run-off in the Itzicuaro River, from storms of the 1943 and succeeding summer rainy seasons, was heavily charged with volcanic ash. At first, irrigation canals and ditches were choked with ash deposits. It was a costly and difficult task to keep them open. Next the diversion dam was washed out and irrigation waters were stopped. Several millions of dollars had already been lost as a result of floods out of the ash-covered mountains. Floods heavily charged with ash brought down great boulders and floated them out over good farm land in the valley. Thus far, the erosion occasioned by the volcano has done greater damage than the lava, heavy though that is. But the volcano is not yet extinct and its effects direct and indirect are still going on.

One of the least expected effects of the ash fall was the reduction in the fruit crop. Bees that pollinated flowering fruit trees were killed off in some way. Lacking these busy agents of pollination, the fruit crop has been short for the past 2 years.

But the ash when not too deep does little damage to the soil. In fact, villagers at Zirosto told us that where they could plow through the ash-cover into the underlying soil their crops were greater. Their wheat yields were three-fold that before the eruption. The ash, when not deep, may serve as a mulch that increases rain intake and reduces surface evaporation.

Moreover, the ash is one of the best of soil materials. The lava and ash are derived from an olivine basalt of the volcano. This material contains a good store of the elements required in a fertile soil except nitrogen. As soon as the ash weathers enough to release fresh supplies of plant nutrients, it can be looked upon as a blessing. But until that time, accelerated rilling and gullying have caused and still are causing considerable damage.

The villagers of Zirosto would not leave their homes, even though the Government had offered to resettle them as were those of Paricutin and San Juan de Parangaricutiro. Ash fall about Zirosto measured about 12 inches in depth and had smothered and destroyed all pastures for their livestock. They butchered or sold their cattle and draft animals. The ash was too deep to plow with local wooden plows. Yet with these resources gone the villagers still stayed on, hoping to get the use of tractors and large plows to turn up some of the old soil for a seed bed. They had confidence that their crops would be better than before.

Volcanoes do not occur every day. Eruptions

change the shape of the landscape and spread their effect in ash falls over large areas. The Paricutin volcano and erosional phenomena in the mantle of ash spread over the country are doubtless similar to many occurrences of the past as is shown by the hundreds of extinct, forest-clad volcanic cones of the State of Michoacan, Mexico. The valley floors filled in with ash washed off steeper slopes of mountains and cones and finally formed fertile valleys as the fresh ash weathered. When principles of soil conservation and sound soil management are applied, these ash-derived soils are among the most fertile.

Erosion in the raw furnishes opportunities for studying phases of the dynamics of erosional processes that are operating at much slower rates in unaffected landscapes. Erosional phenomena in the mantle of volcanic ash spread by the Paricutin volcano disclose a full range of processes of land sculpture. Erosion and storm run-off are accelerated. Eroded ash is washed out in valleys between old volcanic cones to form alluvial fills so characteristic of this part of Mexico. Flood flows cut deep gullies through these valley fills and carry great amounts down stream to the coastal plain. After the eruption dies down and vegetation again reclothes the land surface, fertility will be released as this latest layer of ash weathers.

Prospects for control of this accelerated erosion in thick layers of volcanic ash depend upon whether eruptive activity of the volcano is renewed sufficiently to lay down heavy layers of ash again. If not, accelerated phases of erosion will vary with slopes of gradients until vegetation regains control of surfaces. Within forest stands still living, the annual fall of older pine needles is building up layers of new forest litter that is beginning to, and will, control erosion in the ash layer. But in former cornfields on sloping land, erosion control will depend on the rate of recovery of vegetation or a return to cropping according to principles of conservation farming. Many fields of steeper slopes are so badly cut up with gullies that efficient farming is excluded. Special treatment of such fields is necessary to save these lands from further damage. Fields with flat slopes, however, are generally areas of deposition rather than of erosion. Ash is spread out over these fields in remarkably uniform and even surfaces. Cropping in these cases calls for steps to restore a cover of vegetation of natural growth or crops.

A method of long-range control is also possible. Storm run-off charged with heavy loads of ash in suspension is still cutting rapidly, lowering base levels in big gullies and in streams. Striking exceptions to this down-cutting were found in old lava flows that in some former volcanic eruption had flowed down former valleys and come to an end. These lava plugs serve to establish base levels of erosion for the drainage above such points. Cutting of lateral channels is controlled by these lava plugs and suggests the construction of permanent check dams at strategic localities to establish other base levels of cutting. Such structures would call into play the principles of physiographic engineering or torrent control as has been worked out in the Basses Alpes, France.

Measures for speeding up the spread of a ground cover of vegetation call for experimental studies in reseeding with suitable crop plants including legumes and in fertilizing the raw ash. Wherever underlying soil in old fields can be mixed with fresh ash by deep plowing, crops may be grown with prospects of good yields.

Favorable effects of the ash layer when not over 6 inches thick may be due to a number of influences. One of the most important is the mulch effect in the conservation of moisture and heat. Excellent opportunities exist throughout the ash covered area to carry on investigations on various effects of this remarkable ash layer.

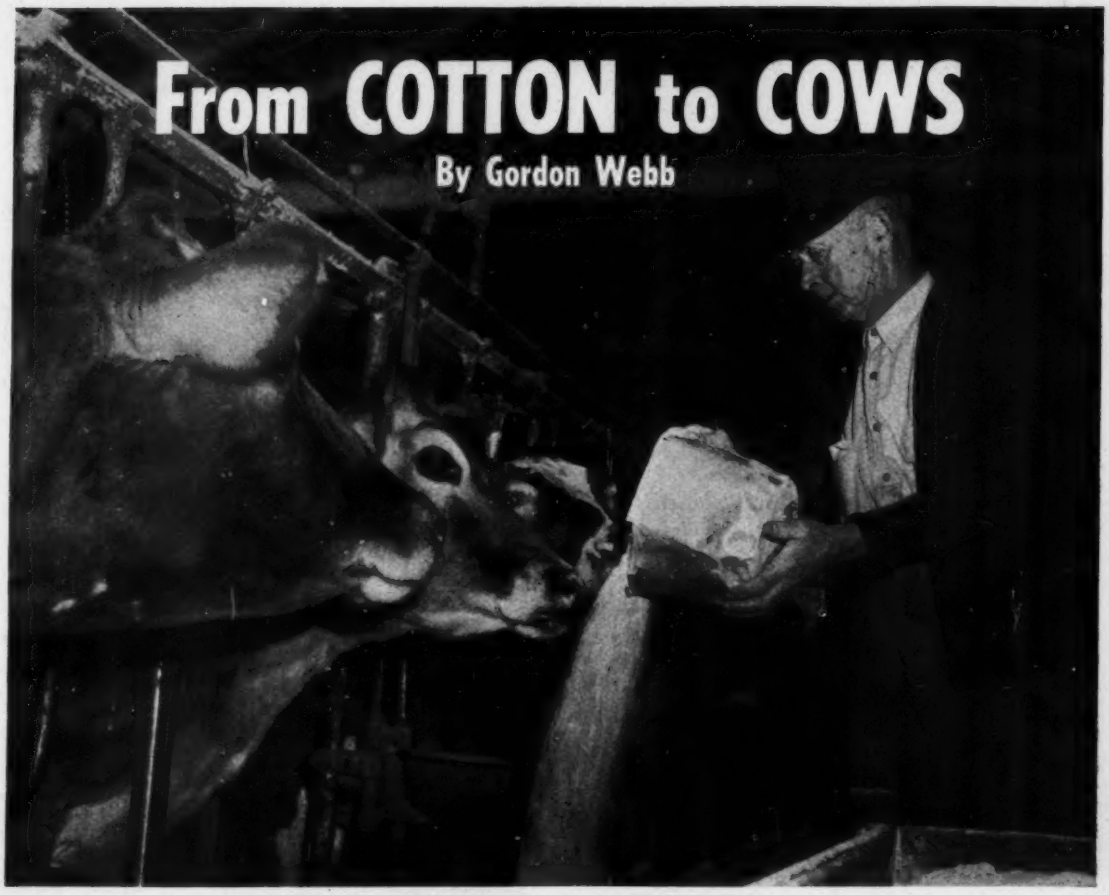
The fall of volcanic ash over this picturesque forest and farming country has had a damaging effect in smothering out crops and vegetation and in accelerating erosion from slopes where the ash fall was heavy. On the other hand, the ash, being excellent soil material, will in time make lands more productive of crops. By applying principles and measures of physiographic engineering and conservation farming, damaging effects of the ash may soon be brought under control, provided, of course, no further violent eruptive activity of the volcano takes place.

Lava flows in their formidable jagged black mass are an entirely different story, for it will take a geologic age for the lava to weather. Land covered by the lava flows is put out of any use for a long, long time.

That one idea, found in the pages of *Soil Conservation* Magazine, may be worth a lot to that neighbor of yours. He, or you, may subscribe by sending $1 to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

From COTTON to COWS

By Gordon Webb



The cows are eager for this ground feed, largely home-grown on land terraced, contour-tilled, and under good crop rotation.

THE SOUTH has lost thousands of young men and women because they believed there were greater opportunities elsewhere. But W. D. Finch, Sr., has kept three of his four sons with him on his 170-acre farm near Pauline, S. C., by changing from cotton to dairy farming and by following a soil conservation plan that puts all his land to its best use. The other son had moved North before the decision was made.

During the war, the elder Finch and W. D., Jr., ran the dairy business while M. C. and John served in the Army. The boys are back now, and the father-son combination is clicking. The dairy makes a good living for all.

The change from cotton to livestock came about through hard work, good cattle, and soil conservation. Registered Jersey calves entered the picture when Ernest Carnes was county agent of Spartanburg County, and two of the boys were 4–H Club members. Soil conservation took hold in 1938 when J. H. Talbert, Soil Conservation Service, helped the Finches to plan and get under way a complete program for erosion control, soil building, water conservation, and good land use. This work is being continued in cooperation with the Broad River Soil Conservation District.

NOTE.—The author is head, current information section, Soil Conservation Service, Spartanburg, S. C.

Kudzu has made valuable some of the land on the Finch farm—land that was once the poorest.

As for hard work—well, the Finches have always worked that way. But with cotton, they always seemed to be in debt. The oldest son, E. E. Finch, already had left the farm for a job in Toledo, Ohio, before dairying was started.

Talbert first told us about the Finches. We went to the farm to make a picture of the cattle grazing kudzu. It was just before frost, and the permanent pastures had played out. We found 30 cows grazing on 5 acres of kudzu where once had been some of the poorest land on the farm.

A few days later we stopped W. D. Finch, Jr., while he was delivering grade A milk to customers in Spartanburg.

He told us the change in farming didn't happen overnight. The Finches "grew" into the dairy business, with the 4–H Club animals as foundation stock. Fifteen of the thirty cows are registered Jerseys. The rest are good grade Guernseys and Holsteins. A registered Jersey bull leads the herd.

Cotton last was planted on this farm in 1940. That was the year the Finches started selling bottled milk. Since that time the cotton house has been used to store grain and hay.

You might say that the Finches have established a dairy business on 110 acres, for 60 of the 170 acres are in woods. On this open land they grow all the roughage—hay, silage, and grazing—required by their cattle and about one-third of the grain ration—oats, barley, and corn. The Finches find that the close-growing crops and pastures are much easier on the land than cotton.

Crimson clover is a key crop in the livestock program, and W. D., Jr., said he remembers that the Soil Conservation Service gave him the first

(Continued on page 293)

This hybrid corn, tried last year, looks good to John Finch (right) and J. H. Talbert.

Madrid Sweet Clover—a promising newcomer

By Joe C. Tinney

Checking up on their potential seed yield of yellow annual sweet clover. Mr. and Mrs. J. M. Gill are cooperators in the Central Colorado Soil Conservation District.

MADRID sweet clover has become increasingly popular during the past 3 years among farm and ranch cooperators of the Central Colorado Soil Conservation District in the Coleman, Tex., vicinity. It has proved excellent for conservation and improvement of the soil, and serves well as a cash crop and temporary pasture plant. Before the advent of this legume none had been used in this district.

The Madrid variety of sweet clover is a biennial, yellow-blossom type comparatively new to the Western Gulf region of the Soil Conservation Service. It is leafier, finer stemmed, and has more vigor when young than some of the more common varieties of sweet clover. Current indications are that it contains very little coumarin, an element detrimental to livestock, that is found in some sweet clover.

NOTE.—The author is work unit conservationist with the Soil Conservation Service, Fort Worth, Tex.

Farmers who have knowledge of the productiveness of their land over a long period of years report that maximum oat yields have declined from 80 or 100 bushels per acre to 50 or 60 bushels. Cotton lint yields have fallen from half a bale to one-fourth or one-third bale per acre.

Ulmer Brannan, a cooperator in the Buffalo conservation group near Santa Anna, has owned and operated the same land more than 40 years. He says, "My crop yields are only half as large as they were 25 years ago. Although the land has been terraced and planted on the contour for the past 10 years, yield increases have been slight because these practices alone cannot increase soil fertility. The land needs soil improving crops, such as sweet clover, to build it back."

Madrid sweet clover is palatable to livestock. One Coleman farmer reports that his sheep grazed it to the ground before starting on Sudan grass in the same field.

Stock farmers are finding the carrying capacity of Madrid sweet clover superior to that of any other temporary pasture crop they can grow in the Coleman area. It provides from two to four

Ewes and lambs on 7-acre field of yellow annual sweet clover, Raymond McElrath farm, near Coleman. McElrath ran 20 ewes and 60 December lambs on the clover two weeks. He says he'll have to increase stocking rate to prevent clover from becoming rank.

times more grazing for livestock than does common Sudan grass. Raymond McElrath, soil conservation district cooperator at Coleman, says that his Madrid sweet clover provided adequate pasture for 63 days during the summer of 1944 for an average of 19 sheep per acre. Again in the fall, 38 sheep per acre were grazed for 3 weeks, making a total of 14 animal months of grazing per acre for the year.

Another cooperator, W. F. Barnes, of Santa Anna, last summer grazed 200 ewes and their lambs on 20 acres of Madrid sweet clover from June through August. That amounts to 10 animal months of grazing per acre. William F. Deal, Gouldbusk conservation farmer, pastured the equivalent of 12 cows and 85 ewes for 5 weeks on a 6-acre field on his place. Grazing for 400 sheep for a week and for 40 cows for 2 weeks on 8 acres is the record of Harold Wheat, another district cooperator at Gouldbusk. He left stubble standing from 8 to 12 inches high when he took his stock off the 8 acres.

With proper stocking, it is thought that the grazing period for Madrid sweet clover may be extended from May 15 through December. Such a grazing period would fill a strongly felt need for an adequate forage plant of high nutritious quality to meet the grazing requirements of livestock while permanent pastures are getting needed rest. The crop usually is planted in February and March and is ready to graze by May 15. Growth continues until January when hard freezes usually cause the plant to become dormant. Local growers around Coleman recommend that sufficient acreage be planted each year to satisfy the grazing needs of the farm and that the second-year growth be used only for soil improvement and seed production.

The income of Central Colorado Soil Conservation District cooperators has increased by growing Madrid sweet clover for pasture and soil improvement. Income from sale of seed alone is equal to, or greater than, the proceeds from the usual cash crops. The Madrid seed is harvested with a combine. The crop residue is left on the ground to help improve productivity and soil structure and to help control erosion.

Andy Broyles, a supervisor of the soil conservation district who lives near Talpa, harvested 10 acres of seed last year. He made $40 an acre from the harvest, although he estimates that harvesting difficulties forced him to lose at least half of the seed produced.

The cost of growing Madrid sweet clover is low. Only 3 to 5 pounds of seed are planted to the acre. Current prices run from 25 to 32 cents per pound. In planting, regular 36- to 42-inch rows are satisfactory. A smooth, firm seed bed is essential. A row-planter, with the covering plows and opening sweeps removed and equipped with plates having five holes of three-sixteenth-inch diameters, has

been successful in seeding at the desired rate. A chain or light sandbag dragged behind the planter covers the seed to about one-half-inch depth. A tight seedbox prevents unnecessary loss.

Cooperator Jim Gill of Whon reports soil structure, fertility, and productivity greatly improved after he had used the clover three consecutive years on one 3-acre plot. A check plot which had never grown a soil-improving crop was laid off with the clover plot. The check was to be plowed and seeded to oats, but Gill found the ground there too hard to plow. His clover land was mellow and turned easily.

Trial plantings of annual yellow-blossom, common biennial yellow-blossom, Hubam and Madrid sweet clover have been made by cooperators of the Central Colorado District during the past 3 years. They have found the Madrid variety outstanding.

Demand for seed increased from less than 300 pounds in 1943 to more than 3,000 pounds in 1944 and over 6,000 pounds in 1945. For 1946 the figure is above 10,000 pounds. Before the trial plantings, sweet clover was not believed adapted to this section.

B. B. Fowler, chairman of the board of supervisors for the Central Colorado District says, "Madrid sweet clover is definitely here to stay. It's a crop we need, one we can use handily, and one which pays us handsomely."

Farmers expressed their approval of the plant last summer when they met with the district supervisors of the soil conservation district at Coleman and organized the Central West Texas Madrid Sweet Clover Improvement Association. The organization's purpose is to promote a readily available source of pure seed. Madrid sweet clover is recommended for north Texas and for Oklahoma by the experiment stations of these states.

FROM COTTON TO COWS

(*Continued from page 291*)

seed he planted on an observational plot. Talbert inoculated the seed and helped him to plant it. That was in 1938.

"We have 25 to 27 acres of crimson clover every year," W. D., Jr., said, and then he told us where most of it was grown last year. "All the back field, about 8 acres above our permanent pasture, was in clover and rye grass. The east field, next to the Allen farm, was in clover for spring grazing; about 6 or 7 acres there. We had about 3 acres in the field where you saw the cotton house full of hay and grain. Then there were 4 or 5 acres of clover and oats across the road from the mail box where the road turns to Mr. Gregory's. We turned that under and planted silage corn—and did it make corn! This land had a heavy application of fertilizer and manure."

In addition to its use for grazing and soil improvement, crimson clover planted with oats and barley produces a part of the hay crop on the farm.

The Finches have 15 acres of what W. D., Jr., called "a really improved pasture."

"In the spring of 1945 we fertilized and limed our improved pasture, and it really paid," he declared. "We used the manure spreader to put out 3 tons of lime per acre. Then we spread 600 pounds of 18 percent phosphate fertilizer and 700 pounds of basic slag per acre."

This pasture contains lespedeza, Dallis grass, Bermuda grass, and yellow hop clover. "And we're trying to get white clover started," W. D., Jr. added.

Cotton and corn formerly grew where this pasture has been made, and the Finches are planning to put the rest of the field—the 8 acres which grew crimson clover and rye grass in 1945—into permanent pasture. They hope to get a start of an improved Bermuda grass in this new pasture.

Then we asked the young dairy farmer about the 5 acres of kudzu.

"We'd have been without grazing if we hadn't had that kudzu," he said. "We kept the cows on the kudzu until about 11 o'clock each morning, and it helped to keep up milk production."

Finch said that the kudzu provided grazing for the 30 cows for 3 weeks, and that its worth was around $25 an acre. He arrived at this estimate by calculating how much hay he would have had to feed if it weren't for the kudzu.

The original planting of kudzu covered only 3 acres. Since 1938 the vines have been permitted to spread to two additional acres. "We're going to let it keep on spreading," the elder Finch told us.

Soil conservation and dairy farming have been good for both the Finches and the land. As W. D., Jr. expressed it, "We've paid off all our debts since 1938, and the land is a lot better."

During and since the war, demand and price for milk have been good. So far as the future is concerned, John Finch spoke for the family when he said, "If you produce better milk you can sell it."

REVIEWS

PAY DIRT. Farming and Gardening With Composts. By J. I. Rodale. $3. New York. Devin-Adair Company. 242 pp.

"Pay Dirt" is undeniably a controversial book; therefore, it is good reading and likely to do a great deal of good. The book already has started considerable discussion—some of it pretty heated—in the short time since it was published.

Two important—and highly articulate—groups undoubtedly will dislike "Pay Dirt:" the fertilizer manufacturers, who will have no difficulty whatever in discovering that Rodale has no use for their product; and the soils scientists, who, humanly enough, will not like to have their comfortably fixed ideas about soil management and productivity upset.

Actually, there are few statements in the book which you can put the finger on as wrong, except by inference, but while you cannot agree with everything the author says, neither can you wholly disagree.

For instance: No soil conservationist in his right mind would dream of arguing against Rodale's first premise, that soil with a lot of organic matter in it is better than soil with little or no organic matter. The need for high humus content in soil is accepted generally. Its advantages are many and they are common knowledge. Most soil conservationists, on the other hand, certainly would dispute the inference that ample organic content would so control erosion as to make physical and agronomic measures unnecessary. That is one of several places in his book where one is inclined to think that the author has let his earnest enthusiasm lead him into sticking his neck out too far. This, of course, is not a peculiarity of this author; remember "Plowman's Folly"? And it is this sort of rash zeal which makes people call Rodale a "cultist," to which he objects so strongly.

In spite of sounding pretty much like a patent-medicine testimonial in spots, "Pay Dirt," is a challenge not only to all gardeners and farmers, but to agricultural scientists, particularly those engaged in research to improve our agriculture and benefit our people. Not enough has been done in this field to enable anyone to say finally and specifically that the author is right or wrong. This was indicated, I think, by Constantin C. Nikiforoff, who wrote in "Soils and Men" (USDA Yearbook for 1938): "Humus serves a number of functions, *all of which are not fully understood at present.*" It seems that this is still true, 8 years afterward.

—William C. Pryor

ICELAND FORESTER REPORTS

Hakon Bjarnason, of the State Forestry Service of Iceland, who visited *Soil Conservation* Magazine last summer, writes from Reykjavik:

"I stayed in Alaska for 7 weeks and visited Juneau, Sitka, Cordova, Seward, Anchorage, Palmer, and Fairbanks but I spent most of my time in College Fjord, Prince William Sound, and on the Kenai Peninsula gathering seeds. I was able to get some 200 pounds of Sitka spruce seed, and a little of mountain hemlock, white spruce, and some other species.

"I enjoyed my trip very much and I have nowhere met so much friendliness as there. The country is fascinating, with tremendous resources.

"I am sure you would have found it interesting to see the Matanuska farms but I could not help thinking that there have been too many mistakes in colonizing the valley. That project should have been better prepared and organized. . . . I am afraid that you may before long get some disheartening news of soil erosion from different places in the Matanuska Valley. I came to one place where some wind erosion has started recently, and I am sure that if it is not stopped very soon it may cost a lot of money later.

"What I found most interesting in the Matanuska Valley and on the Kenai Peninsula was that there is the same kind of soil that we have all over Iceland, a soil which is very liable to wind erosion.

"On my return from Alaska I took a trip through Oregon and California, saw some tree nurseries and many other interesting things, before I returned to the east coast and back home."

STATUS OF DISTRICTS

Latest official figures show that 1,516 soil conservation districts have been established under 45 State soil conservation districts laws.

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Compiled by William L. Robey, Printing & Distribution Unit

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SOIL CONSERVATION SERVICE

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[1] From the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

STUMPS IN THE WAY OF FOOD PRODUCTION

National Farm Safety Week

July 21-27

WHEREAS an increased supply of food is vitally needed to promote peace and happiness in the postwar world; and

WHEREAS farm accidents rob the nation of thousands of lives and millions of dollars worth of food and other property each year; and

WHEREAS experience in previous observances of National Farm Safety Week has clearly shown the necessity and benefits of a coordinated and constant educational farm-safety program;

NOW, THEREFORE, I, HARRY S. TRUMAN, President of the United States of America, do hereby call upon the Nation to observe the week commencing July 21, 1946, as National Farm Safety Week.

And I request all persons and organizations concerned with agriculture and farm life to do everything in their power to discover and publish the facts about farm accidents, and to develop practical safety programs which farm people everywhere can translate into direct action against hazards which daily threaten their lives and happiness. As a start, I specifically suggest that the farm people of the country observe National Farm Safety Week by resolving to eliminate at least one hazard a day until their farms are as safe as they can possibly make them.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the seal of the United States of America to be affixed.

DONE at the City of Washington this twenty-seventh day of April, in the year of our Lord nineteen hundred and forty-six, and of the Independence of the United States of America the one hundred and seventieth.

HARRY S. TRUMAN.

By the President:

DEAN ACHESON,

Acting Secretary of State.

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